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10/573,661	03/28/2006	Hiroshi Tokairin	287343US0PCT	5655

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EXAMINER	
BOHATY, ANDREW K	

ART UNIT	PAPER NUMBER
1786	

NOTIFICATION DATE	DELIVERY MODE
06/16/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/573,661	TOKAIRIN ET AL.	
	Examiner	Art Unit	
	ANDREW K. BOHATY	1786	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 May 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is in response to the amendment filed May 19, 2011, which amends claims 1 and 4-7. Claims 1-20 are pending.

Response to Amendment

2. Applicant's amendment of the claims, filed May 19, 2011, has caused the withdrawal of the rejection of claims 1-5 and 8-20 under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (WO 03/087023) in view of Fukuoka et al. (JP 2003-272857) and Azuma et al. (JP2000-007604) as set forth in the Office action mailed January 19, 2011.

3. Applicant's amendment of the claims, filed May 19, 2011, has caused the withdrawal of the rejection of claims 6 and 7 under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (WO 03/087023) in view of Fukuoka et al. (JP 2003-272857), Azuma et al. (JP2000-007604) and Suzuki et al. (US 2002/0177009) as set forth in the Office action mailed January 19, 2011.

Response to Arguments

4. Applicant's arguments filed May 19, 2011 have been fully considered but they are not persuasive.

5. In response to the applicant's arguments, on pages 27 and 28, the compounds of Shi can only be used in the hole transporting layer because that is where Shi teaches the compound can be used, although Shi teaches the compounds are used in hole

transporting layer Aziz specifically teaches that the asymmetric compounds of Shi can be used the luminescent layer of the device (paragraphs [0021] and [0036]). Therefore, the applicant's argument is not persuasive.

6. Furthermore, in response to the applicant's arguments that Aziz does not specifically teach the anthracene compounds in the luminescent layer, but suggests that compounds can be in either the hole transport zone, electron transport zone, or the luminescent layer, Aziz teaches in paragraph [0014], especially in device (8), that the luminescent layer can comprise an anthracene compound. This teaching by Aziz shows that the luminescent layer or light emitting layer can comprise the asymmetric anthracene compounds of Shi; therefore, the applicant's argument is not persuasive.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

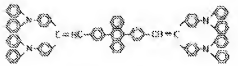
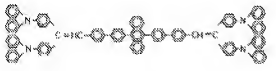
1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 1-3, 6, 7, and 8-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (WO 03/087023), wherein Ikeda et al. (US 2005/0214565) (hereafter "Ikeda") is used as the English translation, in view of Fukuoka et al. (JP 2003-272857) (hereafter "Fukuoka"), wherein a machine translation is used as the English translation, Azuma et al. (JP2000-007604) (hereafter "Azuma"), where a machine translation is used as the English translation, and Ikeda et al. (WO 2004/016575), where Ikeda et al. (US 2006/01344456) (hereafter "Ikeda '456") is used as the English equivalent.

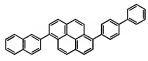
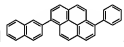
10. Regarding claims 1-3, 6, 7, and 8-20, Ikeda teaches an organic electroluminescent device comprising an anode, a hole injecting layer composed of TPD232 (applicant's formula (X)) disposed on the anode (claims 15 and 16, paragraphs [0143] and [0151]), a hole transporting layer composed of BPTPD (applicant's formula (XI)) disposed on the hole injecting layer (claims 17 and 18, paragraphs [0143] and [0151]), a light emitting layer disposed on the hole transporting layer, an electron transporting layer composed of Alq disposed on the light emitting layer (claims 19 and 20, paragraph [0143] and [0151]), and a cathode disposed on the electron transporting layer (paragraphs [0143] and [0151]). Ikeda further teaches that the light emitting layer is composed of an asymmetric compound that emits blue light and the asymmetric compound can be a host material (claims 2 and 3) (paragraphs [0143] and [0151], compound A1, Table 1). Ikeda teaches the asymmetric compound is a host material for a blue emitting styrylamine based light emitting molecule (claims 3, 8, 13, and 14) (paragraphs [0151] and [0152]) compound D1).

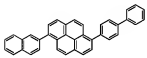
11. Ikeda does not teach where the organic electroluminescent device emits white light and furthers comprises a yellow light emitting layer, wherein the yellow light emitting layer comprises the same host material as the blue light emitting layer and contains a dopant with multiple fluoranthene skeletons. Furthermore, Ikeda does not teach where the blue light emitting dopant meets applicant's formula (iii) and where the host material is a pyrene compound.

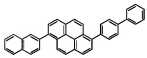
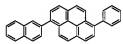
12. Fukuoka teaches a white light organic electroluminescent device, comprising in order an anode, a bluish color light emitting layer disposed on the anode, a yellow-to-reddish color light emitting layer disposed on the bluish color light emitting layer and a cathode disposed on the yellow-to-reddish color light emitting layer (paragraph [0013]). Fukuoka teaches that the yellow-to-reddish color light emitting layer contains the same host material as the bluish color light emitting layer (paragraph [0038]). Fukuoka further teaches the yellow-to-reddish color light emitting layer comprises a dopant, which is a compound having multiple fluoranthene skeletons (paragraphs [0038]-[0043], [0048]-[0050], and [0052]). Fukuoka teaches the yellow-to-reddish color dopant has a fluorescent peak wavelength 540 nm to 700 nm (paragraph [0058]). Fukuoka teaches the bluish color light emitting layer can have a thickness of 5 nm to 30 nm and the thickness of the yellow-to-reddish light emitting layer is 10 nm to 50 nm (claim 12) (paragraph [0059]). Fukuoka teaches this type of organic electroluminescent device produces a white light organic electroluminescent device with increased luminous efficiency and better white luminescence (paragraphs [0004]-[0006]).

13. Azuma teaches blue light emitting materials and teaches the materials meet formula (I) (paragraphs [0008]). Azuma teaches the compounds of formula (I) can have the following structure,  and  (compounds (1) and (9), paragraphs [0038] and [0039]). Both of these compounds are styrylamines and meets applicant's formula (iii), where A is a fused aromatic ring having 14 carbon atoms, r is two, b are substituted phenyl groups (aryl groups having 6 carbon atoms). Azuma teaches in Table 1 (paragraph [0073]), that compound (9) emits blue light by itself (example 5).

14. Ikeda '456 teaches an organic luminescent device wherein the blue light emitting layer comprises an asymmetric pyrene compound (paragraphs [0005], [0014]-[0016], and [0033], compound CH33). Ikeda '456 teaches the pyrene compounds can be used as host materials in the electroluminescent device (paragraphs [0034]-[0037]). Ikeda '456 teaches formula (1), where Ar^1 and Ar^2 can be phenyl, naphtyl, or anthracene, as examples, and these groups can be substituted, and Ch is either pyrene or chrysense (paragraphs [0015-[0018]). Ikeda '456 teaches CH13 and CH14, which are asymmetric chrysense compounds (paragraph [0033]). Ikeda '456 teaches the desirable fused polynuclear aromatic compounds provide organic electroluminescent devices with very high efficiency and luminance (paragraphs [0005] and [0006]).

15. It would have been obvious to one of ordinary skill in the art at the time of the invention to have formed an asymmetric compounds using formula (1) of Ikeda '456 and the preferred groups and examples of Ikeda '456 to make compounds with the following formula,  and  . One would expect the formation and use of an asymmetric compound using formula (1) to result in a device having very high efficiency and luminance because such a compound is within the teachings of Ikeda '456 as a desirable material for forming an organic layer of an organic electroluminescent device (paragraph [0005). This compound,

 , reads on applicant's formula (V), where R^{11}-R^{18} are hydrogen, Ar^3 is a 2-naphtyl group, and Ar^4 is a 3-biphenyl group. This compound,

 , reads on applicant's formula (VI), where d is 0, n^1 is 1, x^2 is 0, Ar^5 is a 2-naphtyl group, and Ar^6 is a phenyl group. This compound,  , reads on applicant's formula (V), where R^{11}-R^{18} are hydrogen, Ar^3 is a 2-naphtyl group, and Ar^4 is a phenyl group.

16. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify to electroluminescent device of Ikeda to include a yellow-to-reddish color light emitting layer disposed between the bluish color light emitting layer and the cathode, wherein the yellow-to-reddish color light emitting layer comprises the same host material as the bluish color light emitting layer, a dopant with a fluorescent

peak wavelength of 540 nm to 700 nm, and a compound having multiple fluoranthene skeletons, and wherein the thickness of the both light emitting layer is above 5 nm. The motivation would have been to produce a white light organic electroluminescent device with increased luminous efficiency and better white luminescence.

17. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the blue light emitting styrylamines of Ikeda for the blue light emitting styrylamines, such as compounds (1) and (9) of Azuma. The substitution would have been one known blue light emitting styrylamine for another blue light emitting styrylamine and would lead to the predictable results of using the compounds of Azuma as blue light emitting styrylamines.

18. Given the teachings of Ikeda '546, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the electroluminescent device of Ikeda with an asymmetric pyrene compound as taught by Ikeda '546. Ikeda '546 and Ikeda both teach the use of fused polynuclear aromatic compounds are compounds that can be used as light emitting layer of electroluminescence devices, but only Ikeda '546 teaches the use of pyrenes as one of the fused polynuclear aromatic compounds. The motivation would have been to provide organic electroluminescent devices with very high efficiency and luminance.

19. Claims 1-5, 8-15, 17, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aziz et al. (EP 1385221) (hereafter "Aziz"), in view of Shi et al. (EP 1009044) (hereafter "Shi"), Fukuoka et al. (JP 2003-272857) (hereafter "Fukuoka"),

wherein a machine translation if used as the English translation, and Azuma et al. (JP2000-007604) (hereafter "Azuma"), where a machine translation is used as the English translation.

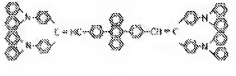
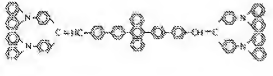
20. Regarding claims 1-5, 8-15, 17, 19, and 20, Aziz teaches an organic electroluminescent device comprising an anode, a hole transporting layer composed of an arylamine (claim 17), a light emitting layer disposed on the hole transporting layer, an electron transporting layer composed of Alq disposed on the light emitting layer (claims 19 and 20), and a cathode disposed on the electron transporting layer (paragraphs [0014] and [0080]). Aziz teaches the electroluminescent device can comprises a hole injection layer between the hole transporting layer and the anode and the layer can be composed of organic compounds (paragraph [0032]). Aziz further teaches that the light emitting layer is composed of an asymmetric compound and the asymmetric compounds are represented by formulae I(A)(3) and I(A)(6)- I(A)(11) and teaches the compounds that emits blue light and the asymmetric compound can be a host material (claims 2 and 3) (paragraphs [0018]-[0021], [0036], [0059], [0064], [0070], [0073], and [0080]). Aziz does not specifically teach the asymmetric compounds, but teaches that Shi teaches the compounds and incorporates Shi into the specification; therefore, the asymmetric compounds of Shi can be used in the Aziz reference. Aziz teaches the compounds are used as host materials for blue emitting dopants and teaches the dopant can be any blue light emitting material (paragraph [0045], [0046], and [0080]). Aziz further teaches the blue light emitting layer has a thickness of 42 nm (paragraph [0080]).

21. Shi teaches several asymmetric compounds that can be incorporated into the Aziz reference that meet Aziz formulae I(A)(3) and I(A)(6)- I(A)(11) (paragraphs [0025] and [0026]). Shi specifically teaches compounds 45-59 as compounds that meet these formulae (paragraph [0026]). Compounds 45 and 50 are a few examples (claims 1, 4, and 5) (paragraphs [0046], [0143], [0146] and [0151]). Compound 50 reads on applicant's formula (I) where R^1-R^8 are hydrogen, Ar^1 is an unsubstituted aryl group having 10 nuclear carbon atoms, and Ar^2 is an unsubstituted aryl group having 6 nuclear carbon atoms (claims 1 and 4). Compound 50 reads on applicant's formula (I), where R^1-R^8 are hydrogen, Ar^1 is a substituted aryl group having 6 nuclear carbon atoms and the two substituents are both aryl groups (phenyl groups), and Ar^2 is an unsubstituted aryl group having 10 nuclear carbon atoms (claims 1 and 4). Compound 50 reads on applicant's formula (II), where a and b are zero, c is 1 and is an unsubstituted aryl group having 6 carbon atoms, n is 1, Ar is an unsubstituted aryl group having 10 carbon atoms, and Ar' is an unsubstituted aryl group having 6 carbon atoms (claims 1 and 5).

22. Aziz does not teach where the organic electroluminescent device emits white light and furthers comprises a yellow light emitting layer, wherein the yellow light emitting layer comprises the same host material as the blue light emitting layer and contains a dopant with multiple fluoranthene skeletons. Furthermore, Ikeda does not teach where the blue light emitting dopant meets applicant's formula (iii).

23. Fukuoka teaches a white light organic electroluminescent device, comprising in order an anode, a bluish color light emitting layer disposed on the anode, a yellow-to-

reddish color light emitting layer disposed on the bluish color light emitting layer and a cathode disposed on the yellow-to-reddish color light emitting layer (paragraph [0013]). Fukuoka teaches that the yellow-to-reddish color light emitting layer contains the same host material as the bluish color light emitting layer (paragraph [0038]). Fukuoka further teaches the yellow-to-reddish color light emitting layer comprises a dopant, which is a compound having multiple fluoranthene skeletons (paragraphs [0038]-[0043], [0048]-[0050], and [0052]). Fukuoka teaches the yellow-to-reddish color dopant has a fluorescent peak wavelength 540 nm to 700 nm (paragraph [0058]). Fukuoka teaches the bluish color light emitting layer can have a thickness of 5 nm to 30 nm and the thickness of the yellow-to-reddish light emitting layer is 10 nm to 50 nm (claim 12) (paragraph [0059]). Fukuoka teaches this type of organic electroluminescent device produces a white light organic electroluminescent device with increased luminous efficiency and better white luminescence (paragraphs [0004]-[0006]).

24. Azuma teaches blue light emitting materials and teaches the materials meet formula (I) (paragraphs [0008]). Azuma teaches the compounds of formula (I) can have the following structure,  and  (compounds (1) and (9), paragraphs [0038] and [0039]). Both of these compounds are styrylamines and meets applicant's formula (iii), where A is a fused aromatic ring having 14 carbon atoms, r is two, b are substituted

phenyl groups (aryl groups having 6 carbon atoms). Azuma teaches in Table 1 (paragraph [0073]), that compound (9) emits blue light by itself (example 5).

25. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify to electroluminescent device of Aziz where the host material in the blue light emitting layer where the asymmetric compounds of Shi, include a yellow-to-reddish color light emitting layer disposed between the bluish color light emitting layer and the cathode, wherein the yellow-to-reddish color light emitting layer comprises the same host material as the bluish color light emitting layer, a dopant with a fluorescent peak wavelength of 540 nm to 700 nm, and a compound having multiple fluoranthene skeletons, and wherein the thickness of the both light emitting layer is above 5 nm. The motivation would have been to produce a white light organic electroluminescent device with increased luminous efficiency and better white luminescence. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the blue light emitting dopants of Aziz for the blue light emitting compounds, such as compounds (1) and (9), of Azuma. The substitution would have been one known blue light emitting compound for another blue light emitting compound and would lead to the predictable results of using the compounds of Azuma as blue light emitting compounds.

26. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aziz et al. (EP 1385221) (hereafter "Aziz"), in view of Shi et al. (EP 1009044) (hereafter "Shi"), Fukuoka et al. (JP 2003-272857) (hereafter "Fukuoka"), wherein a

machine translation if used as the English translation, and Azuma et al. (JP2000-007604) (hereafter "Azuma"), where a machine translation is used as the English translation as applied to claims 1-5, 8-15, 17, 19, and 20 above, and further in view of Ikeda et al. (WO 03/087023), wherein Ikeda et al. (US 2005/0214565) (hereafter "Ikeda") is used as the English translation.

27. Regarding claims 16 and 18, Aziz in view of Shi, Fukuoka, and Azuma does not teach where the hole injection layer is composed of TPD232 (applicant's formula (X)) and the transporting layer is composed of BPTPD (applicant's formula (XI)).

28. Ikeda teaches an organic electroluminescent device comprising an anode, a hole injecting layer composed of TPD232 (applicant's formula (X)) disposed on the anode (paragraphs [0143] and [0151]), a hole transporting layer composed of BPTPD (applicant's formula (XI)) disposed on the hole injecting layer (paragraphs [0143] and [0151]), a light emitting layer disposed on the hole transporting layer, an electron transporting layer composed of Alq disposed on the light emitting layer (paragraph [0143] and [0151]), and a cathode disposed on the electron transporting layer (paragraphs [0143] and [0151]).

29. It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the hole injection material of Aziz in view of Shi, Fukuoka, and Azuma for TPD232 as taught by Ikeda and substitute the hole transporting material of Aziz in view of Shi, Fukuoka, and Azuma for BPTPD as taught by Ikeda. The substitutions would have been one known hole injection material for another hole injection material and one known hole transporting material for another

hole transporting material and lead to the predictable results of using TPD232 as a hole injection material in an electroluminescent device and using BPTPD as a hole transporting material in an electroluminescent device.

Conclusion

30. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

31. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANDREW K. BOHATY whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 8:00 am to 5:30 pm EST and every other Friday from 8:00 am to 4:30 pm EST.

33. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Chriss can be reached on (571)272-7783. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

34. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K. B./
Andrew K. Bohaty
Patent Examiner, Art Unit 1786

/Dawn L. Garrett/
Primary Examiner, Art Unit 1786